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More, Better Soybeans

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Lincoln, New Variety, To Be Grown by a Few Iowa Farmers in 1944¹

A NEW SOYBEAN variety that has "showed its heels" in yielding ability to every other bean with which it has been compared in Iowa for the last 5 years will be grown by a few Iowa farmers in 1944 and it should be in the hands of many who want to give it a try in 1945 and 1946. It promises to be one more vital aid to our farmers in their "food battle" of this war period.

The new variety, Lincoln, has outyielded Richland, Mukden, B. H. (Black Hilum) Manchu, Dunfield and Illini in northern, central and southern Iowa tests that range from 3 to 5 years. The Lincoln has been ahead of every other variety in yield in all of these tests every year.

But that doesn't mean that it may be *just the soybean variety you want*. For instance, it doesn't stand up nearly as well as Richland, not quite as well as Mukden, but it is better than Dunfield and Illini. In none of the Iowa Station tests has it ever lodged badly enough to cause excessive loss in harvesting. Then, too, Lincoln is too late, our tests show, to be safely grown in the northern third of Iowa. We are therefore recommending that it be grown only in the counties from Woodbury, Webster, Black Hawk and Dubuque south and not in any counties north of these.

We do not need to lean entirely on the Iowa Station tests to measure the yielding ability of this new soybean variety, for it has had extensive tests in Ohio, Indiana, Illinois, Missouri and Nebraska also. As an average of 61 replicated trials in those five states and Iowa during the 5 years of 1938 to 1942, Lincoln has outyielded Illini and Dunfield by an average of 6.1 bushels to the acre, or 22 percent. It has averaged a day earlier than Illini, has lodged less than either Dunfield or Illini and has had superior seed quality. It has been superior to Dunfield in percentage of protein, percentage of oil and drying

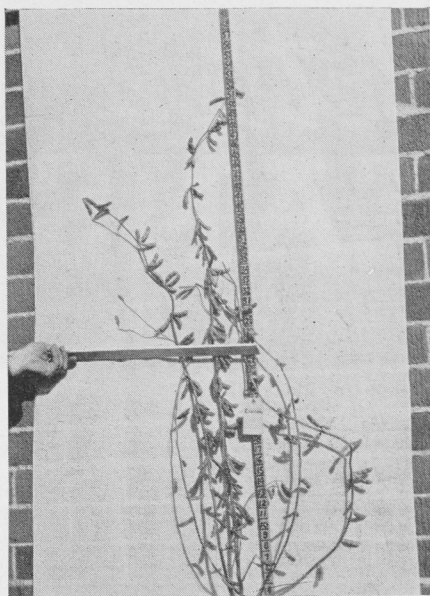
Here's C. R. Weber, in the field at the right, examining Lincoln soybeans in an "increase field" at the Agronomy Farm, Ames, 1943. Lincoln has exceeded the yield of Mukden about 20 percent in central Iowa tests.

¹Cooperative with U.S.D.A. (See page 2.)

More, Better SOYBEANS

BY C. R. WEBER





Above is a single plant of Lincoln which measured 51 inches in height. When planted at normal rates of seeding, Lincoln does not branch as much as this one, seeded at a light rate.

quality of the oil. Dunfield has been considered the best variety in quality of oil.

And so — for the southern two-thirds of Iowa, as well as many areas of our surrounding states — Lincoln offers to step up yield of beans to the acre and, because of its higher oil content, it should be a real boon in this war period when fats and oils are so badly needed.

In order to insure the widest distribution and the most rapid increase of high quality seed of this new bean vari-

ety, local units of the different farm organizations in the southern two-thirds of Iowa were asked to recommend men in the different counties best qualified from the standpoint of previous experience, equipment and weed free soil, to receive the 1943 seed. The whole effort has been to place the seed in such a way as to insure its most rapid increase and ready availability to the largest number of farmers for planting in 1945. Arrangements have already been made for the distribution of the entire 1943 seed supply. Many should be able to obtain seed locally for planting in 1945 and almost anyone who wants it for the 1946 crop.

Not a "Hybrid"

Lincoln is not a "hybrid" bean — it came from a natural variety cross between a white flowered Mandarin and Manchu. The original hybrid between these two varieties was grown by C. M. Woodworth at the Illinois Agricultural Experiment Station in 1935. From individual plant selections made and tested by L. F. Williams of the United States Regional Soybean Laboratory, in short progeny rows, this new variety of Lincoln originated. It was first tested in yield trials in 1938.

In the search for superior adapted varieties of soybeans approximately 3000 plant introductions from the Orient have been tested cooperatively in Iowa by the United States Regional Soybean Laboratory and the Iowa Agricultural Experiment Station. Varieties now recommended, such as Mukden,

Richland, Illini, Dunfield, Black Hilum Manchu and so forth, are the result of single plant selections from plant introductions into the United States. However, not all of these varieties were selected in Iowa. Nor was the Lincoln variety selected in Iowa. The greatest emphasis in soybean breeding work in Iowa is on the production of superior varieties for commercial utilization.

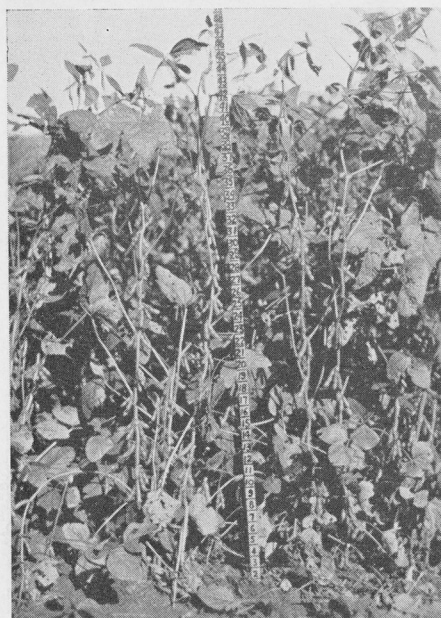
Soybeans, like oats, are naturally self-pollinated. To artificially make a hybrid, it is therefore necessary to apply pollen by hand from one variety to the newly opened flower of another variety. This cross pollination must be performed at a critical stage, and even with skilled workers only a few crossed seeds can be produced from many hours work.

The Iowa Station and other experiment stations are doing some hybridization in cooperation with the Regional Soybean Laboratory. For example, we are trying to "hook up" through hybridization the early maturity and ability which Richland has to stand up and not lodge along with the yielding ability and the good oil qualities of Lincoln.

Hybridization in soybeans is quite different from that in corn. With corn the plant breeder takes plants which normally are cross-pollinated and sees that they are self-pollinated — producing inbreds — finally getting them into purified lines. These inbred lines are then crossed to get the "push" which the crossing of inbreds brings.

Obviously when you have to open the tiny flower of the soybean at just the right stage (using good light and magnifying glasses in order to see what you are doing) and dust on it carefully the pollen from another variety in order to get one soybean pod, we can never hope to get much hybrid soybean seed. Sometimes these pollinations do not "take," and in that case you get no seed for the work. If the pollination is successful, you may get from one to three seeds — average one. The specific purpose of hybridization in soybeans is to bring together and re-combine the characters of two varieties so that in later generations you can select the one or ones that

These are side views of Lincoln seeded at the normal rate. The picture at the left was taken just before maturity and the one at the right was at combine stage. Lincoln lodges less than Dunfield, Illini, Chief, and Black Hilum Manchu, but more than Richland or Mukden varieties.



have the particular characters you want.

It was through a cross of varieties that Lincoln originated, but the cross happened to be one of the few natural crosses — not made by man.

Lincoln has a yellow seed with a black hilum (scar), white flowers, tawny (brown) pubescence (the hairiness of stems and leaves) and resembles Manchu in general habit of growth.

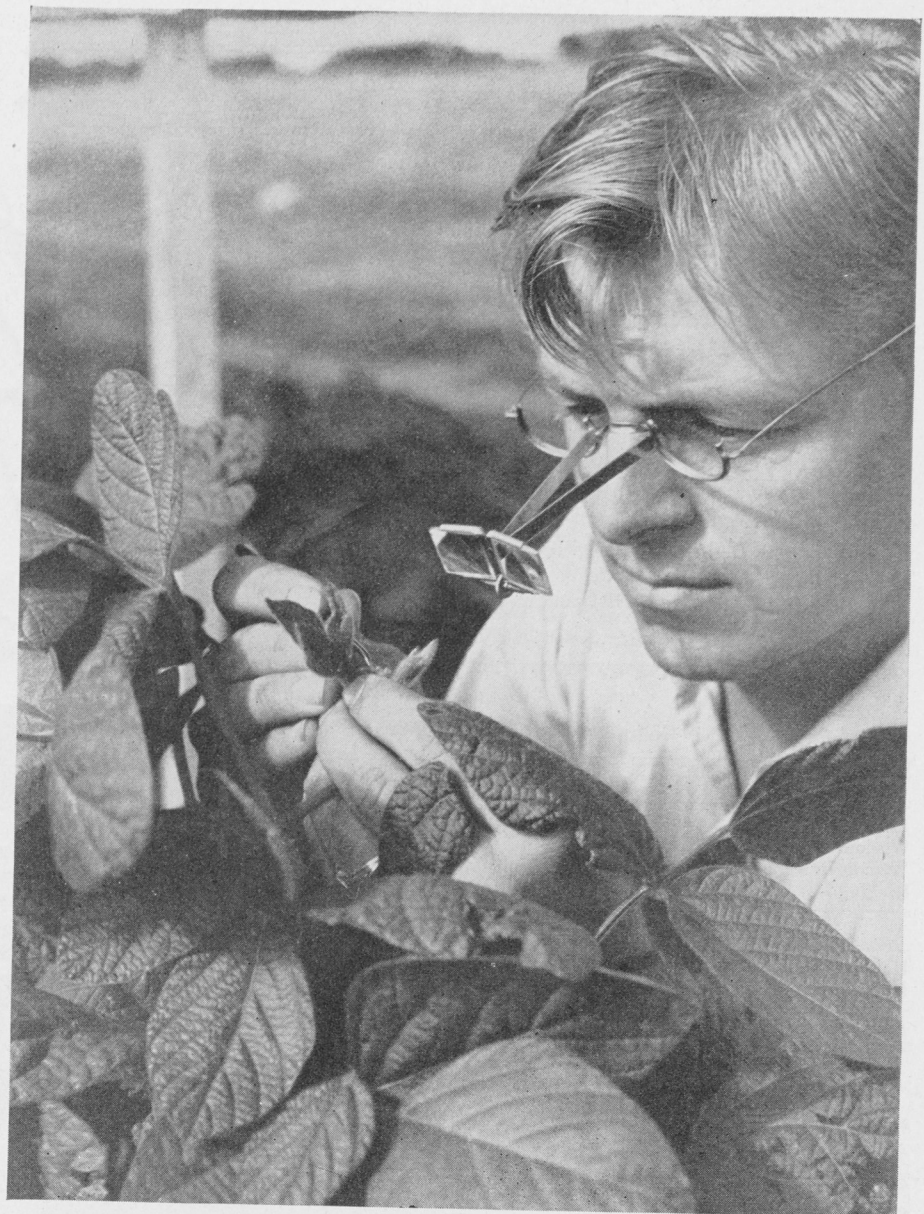
Lincoln is not the "last word" in soybeans and we hope that in the future other still better ones will come. In the meantime, until Lincoln seed becomes available for those in the areas to which it is adapted, what should we do to step up production? Iowa stands second in the United States in the number of bushels of soybeans produced, but third (Illinois and Ohio are ahead) in yield per acre. Iowa might well rank first in average yield per acre because she has more highly fertile soil than any other state. Iowa soybean yields can be expected to rise steadily as farmers gain experience with this crop, which is well adapted to Iowa soil and climate.

How to Increase Yields

Choosing the right variety is of first importance in yield and returns per acre. Richland is the best of those now available for general planting in northern Iowa because of its good yield, earliness and lodging resistance. It should be planted early — May 10 to 20 — on soils of good fertility.

On fertile soils when planting has been delayed, Habaro, which is 5 to 6 days earlier than Richland, may be expected to give satisfactory yields in extreme northern Iowa. Habaro is shorter than Richland and if planted on soils of low fertility, yields may be disappointing and harvesting unsatisfactory. Habaro should be harvested promptly when mature in order to avoid shattering.

The early Manchu strains — Wisconsin Manchu 606, Wisconsin Manchu 3 and Early Minnesota Manchu — are recommended in northern Iowa on the less fertile soils in preference to Richland or Habaro because these Manchu strains are taller. They range in maturity from 3 days earlier to the same as Richland. The early Manchu strains do not stand up well on fertile soils. Earlyana, a new soybean developed by the Purdue Agricultural Experiment Station and tested cooperatively by the Corn Belt experiment stations and the



The above picture shows the technique in hybridizing soybeans. Magnifying glasses and good light are essential. The tiny flower must be carefully opened and the pollen of another variety dusted on the seed producing parts. Lincoln is not a hybrid, but a pure line selection from a hybrid population.

United States Regional Soybean Laboratory, is adapted to the less fertile northern Iowa soils. It is about 3 days earlier than Richland, grows 5 to 6 inches taller, and yields fully as well. However, Earlyana will not be generally available in Iowa for at least 2 more years.

For north central Iowa Richland is recommended for the fertile land and Mukden for the less fertile. For central Iowa, Richland, Mukden, Lincoln and Black Hilum Manchu are recommended. But don't grab your pencil to order some Lincoln seed — for it won't be generally available until 1945. There is no Lincoln seed for sale now.

In southern Iowa, Lincoln, Black Hilum Manchu, Dunfield and Illini are recommended as the topnotchers in yield. Here again you will have to wait a bit for Lincoln — it can't be 1944.

Best Cultural Practices

In order to obtain the highest yields with the variety recommended for your section, the beans should be planted in medium width rows, 20 to 32 inches apart, although there is no advantage to this method unless the beans are cultivated. Since cultivating machinery for medium width rows is not generally available on Iowa farms, here's a proven practical method of increasing the

Comparison of Lincoln with Standard Varieties in Iowa

| Variety | Maturity ¹ | Height (inches) | Lodging ² | Bu. per acre |
|------------------------------------------|-----------------------|-----------------|----------------------|--------------|
| Southern Iowa 1940-41-43 — 6 Tests | | | | |
| Richland | 9-18 | 27 | 1.5 | 18.1 |
| Mukden | 9-22 | 33 | 2.3 | 17.9 |
| B. H. Manchu | 9-24 | 34 | 3.0 | 21.9 |
| Lincoln | 9-25 | 34 | 2.8 | 25.0 |
| Dunfield | 9-26 | 33 | 3.3 | 21.0 |
| Illini | 9-28 | 36 | 4.1 | 22.5 |
| Central Iowa 1939-40-41-42-43 — 12 Tests | | | | |
| Richland | 9-18 | 34 | 2.0 | 30.0 |
| Mukden | 9-24 | 41 | 2.7 | 30.2 |
| B. H. Manchu | 9-25 | 41 | 3.1 | 32.4 |
| Lincoln | 9-27 | 41 | 3.0 | 36.4 |
| Dunfield | 9-30 | 40 | 3.2 | 32.3 |
| Illini | 10-1 | 44 | 3.9 | 31.8 |
| Northern Iowa 1940-41-42-43 — 8 Tests | | | | |
| Richland | 9-26 | 35 | 1.7 | 25.7 |
| Mukden | 9-29 | 44 | 2.3 | 23.5 |
| B. H. Manchu | 9-30 | 41 | 3.1 | 26.1 |
| Lincoln | 10-2 | 42 | 2.9 | 27.0 |
| Dunfield | 10-2 | 39 | 3.1 | 24.4 |
| Illini | 10-4 | 44 | 3.7 | 25.1 |

Comparison of Early Soybean Varieties

| | | | | |
|---------------------------------------|------|----|-----|------|
| Northern Iowa 1940-41-42-43 — 7 Tests | | | | |
| Earlyana | 9-23 | 41 | 3.6 | 30.4 |
| Wisconsin Manchu 606 | 9-25 | 39 | 3.4 | 28.1 |
| Wisconsin Manchu 3 | 9-25 | 40 | 3.7 | 28.5 |
| Richland | 9-26 | 36 | 2.1 | 28.0 |
| Northern Iowa 1939-40-41-43 — 8 Tests | | | | |
| Habaro | 9-14 | 28 | 2.2 | 23.1 |
| Richland | 9-22 | 33 | 1.7 | 24.5 |

¹Maturity — (Month and day) 90 to 100 percent of pods ripe (brown).

²Lodging — A score ranging from 1 (erect) to 5 (prostrate).

number of rows. Adjust the wheels of your two-row corn planter to plant as close as possible; shorten the marker even more. This will space alternate rows closer (about 24 inches has been found satisfactory) than the planter wheel adjustment makes possible. The removal of the outside sweeps from a two-row cultivator makes possible the cultivation in the usual manner of the narrow alternating row widths.

In a good many fields, weeds in the bean rows have been a factor in limiting acre production. Unlike corn, which

usually is cross cultivated, it is necessary to kill weeds in the rows of beans before the weeds appear above ground. A harrow, weeder and rotary hoe are good speedy tools for this job.

The correct rate of planting helps to eliminate weeds, thereby contributing to yield. One bushel per acre of good seed is the recommended rate in medium width rows. Narrow rows drilled 7 inches apart require 2 bushels per acre, and wide, 42-inch rows, require 45 pounds. Good seed means 90 percent or higher in germination and it must be free of sticks, pods, cracked beans and the like.

Date of planting studies indicate that beans planted between May 10 and 25 have yielded more than those planted later. However, if beans are drilled or broadcast seeding should be delayed until May 25 to May 31 in order that more weeds may be germinated and killed.

Inoculation is necessary to insure best results in yield and quality of the crop, if the soybeans are grown for the first

time or if previous inoculation did not form nodules on the roots. If you are not certain of the necessity of inoculation, you had better inoculate for it is cheap insurance against low yields.

If the above practices affecting yields are followed, all in all, there will be less risk in growing beans than any other extensively grown Iowa crop. The importance of soybeans to the farm pocketbook is receiving more and more attention.

About the Tables

Hundreds of strains and varieties have been compared each year through a long period of years, with plantings in different parts of the state. The data in the tables on this page are for the past 5 years. Only those varieties of immediate interest to Iowa farmers are included.

Maturity. The date of maturity given in the tables is the date when the pods are mature. At this stage no damage to market quality will result from a severe killing freeze. From the maturity date given, however, at least a week or 10 days of good drying weather will be required before the beans are ready to combine.

In order to compare differences in maturity between two varieties that are not given in the same table, approximate difference can be established by comparison with the same variety in two tables. For example, Earlyana in one table is 3 days earlier than Richland. In another table Habaro is 8 days earlier than Richland. Habaro can, therefore, be assumed to be approximately 5 days earlier than Earlyana.

Height. Note in the tables that Richland is shorter than any other variety except Habaro. So, Richland and Habaro should be grown only on the more productive soils in the areas recommended.

Lodging. The smaller the number in the table the better the variety stands up. Richland stands up the best of any commonly grown variety, which together with its early maturity makes it ideally suited to the more productive soils in the part of the state where recommended.

Yield. Variety yields are directly comparable within a table and we believe they indicate quite accurately the relative yielding ability of the varieties. Small differences in yield between any two varieties within the same table probably are not significant.

Comparison of Lincoln with Illini and Dunfield in 61 replicated tests in Ohio, Indiana, Illinois, Iowa, Missouri and Nebraska during 1938-42, inclusive.

| Variety | Maturity ¹ | Lodging ² | Bu. per Acre |
|----------------|-----------------------|----------------------|--------------|
| Lincoln | 9-26 | 2.2 | 33.7 |
| Dunfield | 9-26 | 2.9 | 27.2 |
| Illini | 9-27 | 3.1 | 27.9 |

¹Maturity — (Month and day) 90 to 100 percent of pods ripe (brown).

²Lodging — A score ranging from 1 (erect) to 5 (prostrate).